[LOG 3] CONSUMERS PERCEPTION ON DEVELOPMENT OF LRT (LIGHT RAIL TRANSIT) IN SOUTHERN PART OF JOHOR TOWARD GO GREEN TRANSPORTATION

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ABSTRACT

This research is conducted in order to analyze the consumer perception on development of Light Rail Transit (LRT) in southern part of Johor towards go green transportation. Johor Bahru (JB) is the capital city of Johor, Malaysia and it is located at the southern part of the state. The largest metropolitan area in the southern part of the state had a population of about 1.3 million. Southern area is one of the five corridor that was presented under the Ninth Malaysia Plan to bridge development imbalances which known as Iskandar Malaysia. One of the plans is to focus on Transit-oriented Development (TOD) that included the mass-oriented rail base urban public transportation system to reduce usage of personal transportation. The objective of this research are to evaluate perceived usefulness of developing the Light Rail Transit (LRT) in the southern part of Johor, evaluate perceived ease of use the development of LRT in the southern part of Johor and evaluate perceived convenient of development of Light Rail Transit (LRT) in the southern part of Johor. At the end of this study, there are two hypotheses can be concluding, first hypothesis is the development of LRT are perceived usefulness, ease of use and convenient in the southern part of Johor. The second hypothesis is the development of LRT are not perceived usefulness, ease of use and convenient in the southern part of Johor. These studies are focused on consumer perception towards technology implementation of transportation, and extended Technology Acceptance Model (TAM) is used as a theory of this study. The samples are taken from population in southern part of Johor.

Keywords: *Light Rail Transit (LRT), Transit – oriented Development (TOD), Iskandar Malaysia, Technology Acceptance Model (TAM)*

INTRODUCTION

Johor Darul takzim is one of the states of Malaysia which located in the southern part of Malaysia. The capital cities of Johor are Johor Baharu that located opposite of Singapore at the most southern in peninsular Malaysia (Sirima & Sidh, 2012). Johor Baharu area also located the economy of southern region of Malaysia which included the commercial and industrial business. According to Rizzo and Glasson (2012), this capital city of Johor is pedestrian-unfriendly, statistically high percentage of congestion and accidents. Travel this cities by public transportation is unreliable and ineffectiveness due the high rates of traffics in Johor Baharu.

The factors that contribute to the high percentage of congestion are the causeways which built to link between the Singapore and Malaysia mainland and the highways of north-southern expressways. Other factors that contributes are the ports cities that near with the capital cities of Johor Baharu. According to Glasson (2012) Iskandar Corridor are divided into five flagship zone with the two flagship zone are the port area which are Port of Tanjung Pelepas (PTP) and Johor Port in Pasir Gudang area. These ports are located at the Western and Eastern gate flagship zone in Iskandar Malaysia.

The areas of Iskandar Malaysia development region are covering almost 221.634 hectares (2.217 square kilometers). These areas are twice size of Hong Kong and equivalent with size of Singapore. Mostly the area of Iskandar Malaysia are in the Johor Baharu district which the capital cities of Johor. The Iskandar Malaysia also covers the some part of Pontian District namely, Mukim Sg. Karang, Mukim Jeram Batu, Mukim Serkat and Pulau Kukup (Mukim Ayer Masin). One of the Iskandar planning called South Johor Economic Region (SJER) planning is focusing on the Iskandar Malaysia Transportation planning that consists of three elements which are Urban Transportation, Freight Transportation and Green Transportation. To implementation three elements of transportation planning, the Iskandar Malaysia is concentrating in transit-oriented development concept (TOD).

Transit-oriented development are define as a method that places a mix of high intensity uses within 400 meter radius of rail or bus-based transit station with public transportation, walking and cycling are the main modes in this development. One of the focusing public transportation in transport-oriented development is rail and light rail transit (LRT). There are 38 stop station and 10 main station as transfer station will be served by the Light Rail Transit Service. The main objective for this development is to reduce the traffic congestion which cannot accommodate the higher volume of vehicle in the capital cities of Johor that one of important economic area called Iskandar Malaysia.

STATEMENT OF THE PROBLEM

The public transport in the 1960s is not the priority sector alongside the rapid economic structure of Malaysia. In Malaysia, the public transportation still far behind from the other ASEAN country such as Singapore and Hong Kong which can make the private car user change into public transportation user (Minhans, 2013). According to Minhans (2013), other research has conclude that the reason of poor public transportation because a factor such as the connection between the point of consumption and point of destination. Other lacks of public transportation that make difficult to user change from private car are the availability of the mode transportation, the table of route and image of transportation service itself. Hopefully the development of Light Rail Transit (LRT) can help the bad image of public transportation and reduce the congestion on the road due the increases of private user every year. Regarding this problem the consumer's perception should be aware by the developer to make sure the public transportation is easily to use, effective and convenience.

ISKANDAR MALAYSIA

Iskandar Malaysia is one of the economic corridor launches in 2010 to support the vision of Malaysia to become high income country by 2020 (Nasongkhla & Sintusingha, 2012) Iskandar Malaysia has been clustered into five flagships which mark with zone A (Johor Baharu City Center), zone B (Nusajaya), zone C (Western Gate Development), zone D (Eastern Gate Development) and zone E (Senai-Skudai) (Barau & Qureshi, 2015). One of objective of southern Johor Economic Region plan for the Iskandar Malaysia is to boost the economic and attract the inventors to this corridor through the integrated transportation that focus on public transport development. On the 2011, a coastal highways project under the southern Johor Economic Region transportation plan has been develop to improve the integrated transportation between Johor Baharu and Nusajaya in Iskandar Malaysia. This also gives a benefit to Singapore by connecting this project with second link area that connects Tuas Singapore industrial areas. Based on the figure 1, further integrated transportation planning in Iskandar Malaysia is the development of light rail transit (LRT) that planned complete on 2018 (Nasongkhla & Sintusingha, 2012). This will bring the new environment in the Iskandar Malaysia and new transportation technology implied in that area.

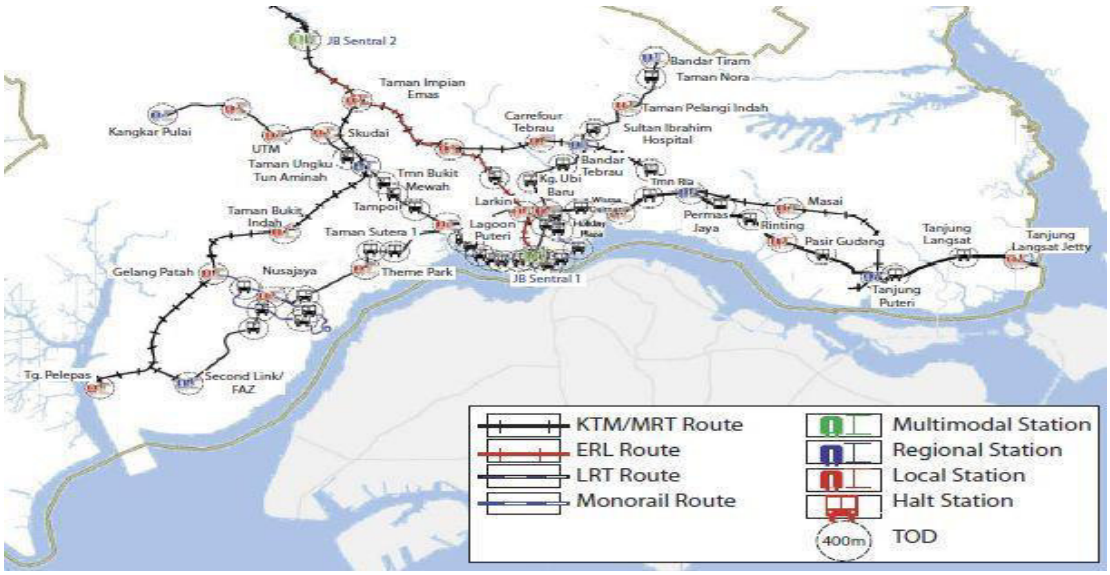

Figure 1

Proposed Comprehensive Public Transportation System for SJER (*Source: My Iskandar Malaysia Portal)*

Theory Acceptance Model (TAM)

In order to identify the consumer perception toward technology applications, there have many theoretical perspective was developed. Theories act as a tool to indicate the success in development and implementation of new technology. Technology Acceptance Model (TAM) well known as most frequently used in consumer perception toward technology applications research (Abu-Dalbouh, 2013). TAM theory aimed to indicate consumer perception for development of new technologies. From the perspective of TAM, perceived ease of use is a belief that a user expects to not put much effort into making use of a particular system, meanwhile perceived usefulness is a belief that a user anticipates that work efficiency can be enhanced by a particular application system (Chang, Yan & Tseng, 2012).

TAM theory was extended by additional of one concept called perceived convenience. The concept of convenience was proposed to have five dimensions which are time, place, acquisition, use and execution (Yoon & Kim, 2007). From this theoretical perspective there are three variables that have a relationship toward customer perception in development of light rail transit (LRT) that shown as figure 2. In this research, perceived use is taking about the consumer are easy to access the service of light rail transport in Southern part of Johor with minimum process. For the perceived usefulness, this research purpose to ensure this light rail transport (LRT) can ensure the congestion in southern part of Johor can be reduce slightly and give a better lifestyle for the citizen. The concept of convenience for this research are to ensure this Light Rail Service are provided at a time which is give more convenient for the consumer, This LRT services are provided with the place are convenient to the consumer to use it. The service provider offer accessibility to consumer uses this LRT service. This LRT service is convenient for consumer to use when there have service provider that offer this LRT services.

Perceive usefulness

Perceive usefulness can be used to determine user acceptance of any new technology around them. This factor or concepts have been used by many authors from different fields of study. According to Abu-Dalbouh (2013) the means of perceive usefulness that develop by Davis (1989) can be defines as the standard to which a person or individual thinks that by using a particular system will improve the task performance. From the previous research about customer adaption in the context of electronic banking (Jahangir & Begum, 2008), the improving of information technology (Khayati, 2013) and it past and future of health care (Holden & Karsh, 2010) shows that perceive usefulness can be uses to evaluate the standard that involve an person or individual in order to improve the task performance that an person or individual have. Perceive usefulness is the factor that will be influence by the various external variables (Abu-Dalbouh, 2013).

In this study, perceive usefulness use to be defined the standard to which development of light rail transit will improve the living standard at southern part of Johor. This development will make people easy to move from one point to another. Individual who use light rail transit will get avoid from congestion. This is because light rail transits have fix route and schedule. Persons who travel use light rail transit will save time and cost. This is because, many time and fuel will be wasted when congestion happen. Individual who use light rail transit to go to work will arrive more early that persons who drive they own vehicle because they do not need to involve in congestion. This shows that development of light rail transit at southern part of Johor will make the movement will be more efficient and perceive usefulness.

Perceive ease of use

Perceived ease of use have been defined by Davis (1989) as the standard that which an individual or person believes that using a particular system is free of physical and mental effort (Abu-Dalbouh, 2013). From the previous research has been conduct to establish that perceived ease of use is an important factors that influencing user acceptance and usage behavior of new technology (Venkatesh, 2008). In this study, examples of perceived ease of use can be e-ticketing where people only need to order ticket online. Many light rail transit nowadays use online ticketing to make user easy to get the ticket. They do not need to line up and wait for they turn to buy a ticket at

counter. They can book ticket where they want to go by using they phone through online and free from physical effort.

Perceive convenience

Perceived convenience is an extended concept for TAM theories that explain about how the ease for consumer to use the particular services more deeply compare to perceived ease of use with perceived convenience was proposed with five dimensions consist of time convenience, place convenience, acquisition convenience, use convenient and execution convenience (Yoon & Kim, 2007). For this research, the time dimension are discussing about the flexibility of time in LRT services which is allowed the consumer to use this service based on schedule and route fixed by the service provider and at the same time the service provider should arrange the schedule based on consumer peak hour. Second dimension are place convenience. The LRT services should be offered in public spot area such a capital city and industrial area. The heavy mobility such as truck in this area will demand this LRT service as a one of the most efficient transportation. Besides, the place convenience also focusing on the building of the station which is placed on this spot area and consist of good facilities such a parking area and pedestrian walking area that can avoid any congestion in the station area at the same time.

In order to operate this LRT services, service provider need to be appointed to ensure all the operation of this LRT service are going smoothly. This service provider also act as a body that have responsivity in maintenance and improvement of this services, this is a third dimensions in perceived convenience concept called acquisition convenience. Uses of convenience as the independent variables for this research are focusing on how these five elements can attract the consumers to use this public transportation. This LRT service will be convenience when one body appointed to do execution for this service manage in good ways for the public users.

METHODOLOGY

These studies generally are using quantitative method. This research is conducted by using questionnaire survey and this questionnaire will be distributed to citizen of Iskandar Malaysia at Johor Baharu. Descriptive survey was conducted in this research. This type of research is to better define an opinion, attitude, or behavior held by a group of people on a given subject. From our study regarding the perception of consumers this is best method to gain the main objective to our study. The southern part of Johor citizen is the unit of analysis study for consumers perception toward Light Rail Transit (LRT). The population of our study is the citizen of Iskandar Malaysia that stated more than 1.3 million people. The cluster sampling method is being use to conduct a research to this population. This method of sampling is due the wide area of the population of Iskandar Malaysia. According to the Iskandar Regional Development Authority (2016), the total population that stated in 2013 was estimated 1.3 million. Thus, researcher should to use sampling method to study this population. According to Krejcie and Morgan (1970) sample size table, for a population which is equal to or greater than 1,000,000, the required sample size is 384. Therefore, the population size of Iskandar Malaysia are greater than 1 million, thus it requires sample size is 384. Researcher should get around 400 of samples data in order to get the accurate data and decreasing error in the research.

Theoretical framework

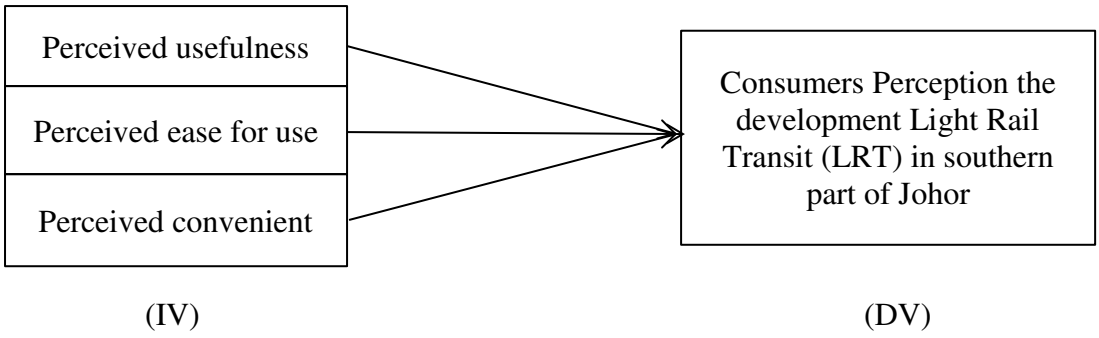

Figure 2
Research framework of consumers perception toward LRT

From the theoretical framework of consumers perceptions toward Light Rail Transit (LRT) in southern part of Johor the hypothesis proposed in this study are:

H1: There is relationship between the perceived usefulness toward Consumers perception the development Light Rail Transit (LRT) in southern part of Johor
H2: There is relationship between the perceived ease of use toward Consumers perception the development Light Rail Transit (LRT) in southern part of Johor.
H3: There is relationship between the perceived convenient toward Consumers perception the development Light Rail Transit (LRT) in southern part of Johor

DATA ANALYSES / FINDINGS

These researches are done using the questionnaire method for the data collection. For the questionnaire the question are using the Likert scale to determine the perception of the consumers. According to Allen and Cristopher (2007), Likert scale is the best method to define the consumer perception, opinion and attitude. The questionnaires are divided into four section of question that represents the each of independent variable and demographic of respondent. There are 400 questionnaire are distributed to the sample at the Iskandar Malaysia using the cluster sampling method to capture all the population in that area.

Another demographic question is discovering the type of work respondent. This will determine the consumers target for the development of Light Rail Transit. In this research the respondent are grouped into 4 type of work. The government respondents participate for these questionnaires are 20 respondents (5.0%). The private sectors group and self-employer are 88 respondents (22.0%) and 89 respondent (22.3%) respectively that participate in this research. Last group the type of group are the highest group participate for this survey. Most of the respondent in this group are the student that studies from the area around the Iskandar Malaysia. From this group also there are the unemployed, retired person and the housewife. These group types of work participate are 203 respondents (50.8%)

Cronbach's Alpha reliability

Table 1
Cronbach's alpha scores for variables

Variables	No. of Items	Cronbach's alpha
Perceived Usefulness	5	0.789
Perceived Easy of Uses	4	0.765
Perceived Convenience	5	0.801

Cronbach's Alpha reliability test is done to measure the reliability of each item in a same group. Although the standards for what makes a "good" α coefficient are entirely arbitrary and depend on theoretical knowledge of the scale in question, many methodologists recommend a minimum α coefficient between 0.65 and 0.8 (or higher in many cases) and α coefficients that are less than 0.5 are usually unacceptable (Goforth, 2015). Based on explanation given above, for the current research, the Cronbach's Alpha reliability is 0.789, 0.765 and 0.801 is considered acceptable.

Table 2
Correlations

		Consumers Perception	Perceived usefulness	Perceived ease of use	Perceived Convenience
Consumers perception	Pearson Correlation	1	.768**	.776**	.710**
	Sig.		.000	.000	.000
Perceived usefulness	Pearson Correlation	.768**	1	.562**	.617**
	Sig.	.000		.000	.000
Perceived Ease of use	Pearson Correlation	.776**	.562**	1	.611**
	Sig.	.000	.000		.000
Perceived Convenience	Pearson Correlation	.710**	.617**	.611**	1
	Sig.	.000	.000	.000	

**. Correlation is significant at the 0.01 level (2-tailed).

From the above analysis, the p-value for correlation is 0.000 which is smaller than α value of 0.01, therefore, we can conclude that there is relationship between consumers perception with perceived usefulness, perceived ease of use and perceived convenient. A positive relationship exists between consumers perception with perceived usefulness (0.768), perceived ease of use (0.776) and perceived convenient (0.710). Its seem that the perceived usefulness, ease of use and convenient has a relationship with the customers perception to use the light rail transit in Iskandar Malaysia

Table 3
Model summary

Model	R	R Square	Adjusted R Squaare	Std. Error of the Estimate
1	.885[a]	.783	.782	.76448

Table 4

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	836.503	3	278.834	477.105	.000[b]
	Residual	231.434	396	.584		
	Total	1067.937	399			

Table 5

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.971	.288		3.377	.001
	Perceived ease of use	1.136	.082	.426	13.781	.000
	Perceived usefulness	1.124	.086	.406	13.037	.000
	Perceived convenient	.521	.085	.199	6.105	.000

The multiple regression analysis suggests that there is significant relationship between consumers perception, perceived usefulness, perceived ease of use and perceived convenience. The value of R^2=0.783, P-value = 0.000 and the relationship among consumer perception, perceived ease of use, perceived usefulness and perceived convenient are significant.

Overall, the model is significant (F= 477.105, p < .001) The R^2 value is 0.783 indicating that the predictors explain 78.3 % of consumer.

CONCLUSION

The Light Rail Transit (LRT) in southern part of Johor was existed under Iskandar Corridor development project planning, from the finding of this research, these LRT service are important based on current demand from the consumer. The mobility in this research location become busier effected from economic growth in Iskandar corridor development area. From our research the customers perception toward the light rail transit will encourage them to use this transportation as their modes of transportation. These are based on strong relationship on the customer perception toward development of light rail transit (LRT). But, the light rail transits as the main modes of transportation are not only based on the customers perception only there are other factors that can influence regarding the main objective of this development. A million of people are travelling every day and this situation cause of traffic congestion and air pollution. These two factors contribute to time inefficiency, low productivity and affect the investor perspective to invest in this economic corridor. In order to have a successful economic corridor, efficient integrated transportation network need to develop to make all the people and freight mobility are effective.

REFERENCES

Agatino Rizzo, J. G. (2012). *The international journal of urban policy and planning.* Johor Bahru: Elsevier Ltd.

Anil Milhans, A. M. (2013). *Transport cost analysis of city bus and private car usage in Johor Bahru Malaysia.* Johor Bahru: UTM Press.

Anil Milhans, N. H. (2013). *Traffic impact assessment: A case of proposed hypermarket in Skudai town on Malaysia.* Johor: UTM Press.

Chi-Cheng Chang, C.-F. Y.-S. (2012). Perceived convenince in an extended technology acceptence model: mobile technology and english learning for college students. Australia. *Australian Journal of Educational Technology.*

Dalbouh, H. M. (2013). *A questioner approach based on the technology acceptence model for mobile tracking on patient progress applications.* Saudi Arabia: science publication.

Eiichi Taniguchi, R. G. (2014). *Recent trends and innovations in modelling city logistics.* Elsevier Ltd.

J. D. Hunt, J. D. (n.d.). *Stated preference investigation of influences on attractiveness of residential locations.* Canada: Commitee on transportation and land development.

Jean-Pierre Maxime Levy Mangin, M. M. (2013). Exploring the influence of price and convenience on perceived usefulness of online banking within the TAM framework: A cross national (Canada and Spain) decision model. *Journal of business theory and practice*.

Khodakaram Salimifard, H. S. (2012). *Green transportation and the role of operation research.* Singapore: Lacsit Press.

Mahmood Mahmoodi Nesheli, O. C. (2009). *Evaluation of effect of traffic signal coordination system on congestion.* Johor Bahru.

S. W. Lee, D. W. (2010). *A tale of asia`s world ports : The spatial evolution in global hub port cities.* Elsevier Ltd.

Vuchic, V. R. (2011). *Urban public transportation system.* Philadelphia.